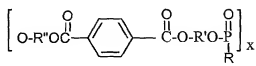
What is claimed is:

1. A polymer comprising the subunit



wherein R' is ethyl or butyl and R and R" are each a suitable side chain or a cross linking agent.

2. The polymer of Claim 1, wherein R is $O(CH_2)_nCH_3$ and n is between 1 and 12.

3. The polymer of Claim 2, wherein R is OCH_2CH_3.

4. The polymer of any one of the preceding claims, wherein R' is CH_2CH_2.

5. The polymer of any one of claims 1 to 3, wherein R" is $(CH_2)_p$ and p is between 1 and 12.

6. The polymer of Claim 5, wherein R" is CH_2CH_2.

7. The polymer of Claim 1, wherein a bioactive component is conjugated to either or both of R and R'' via a functional group.

8. The polymer of Claim 7, wherein the bioactive component comprises a neuroactive protein or peptide.

9. The polymer of Claim 7, wherein the bioactive component comprises a neurotrophic factor.

10. The polymer of Claim 9, wherein the neutrophic factor comprises NGF, BDNF, CNTF, or FGF.

11. The polymer of Claim 8, wherein the bioactive component comprises a cell adhesive peptide.

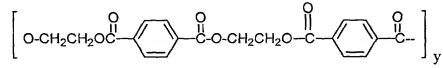
12. The polymer of Claim 11, wherein the cell adhesive peptide comprises the amino acids: Arg Gly Asp; Tyr Ile Gly Ser Arg; or Ile Lys Val Ala Val.

13. The polymer of Claim 1, wherein either or both of R and R" are a cross linking agent comprising one or more metal ions.

14. The polymer of Claim 1, wherein either or both of R and R" are a cross linking agent comprising one or more organic cross linking agents.

15. The polymer of Claim 14, wherein the organic cross linking agent comprises 1,3,5-trihydroxybenzene or $(CH_2OH)_4C$.

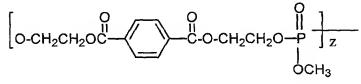
16. The polymer of claim 1, further comprising the subunit



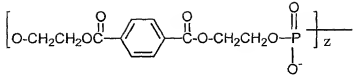
17. The polymer of Claim 16, wherein x is between 5 and 100 and y is between 5 and 100.

18. The polymer of Claim 17, wherein the ratio of x to y is 80:20.

19. The polymer of Claim 16 further comprising the subunit



20. The polymer of Claims 16 further comprising the subunit



21. The polymer of Claim 19 or 20, wherein x is between 5 and 100, y is between 5 and 100 and z is between 5 and 100.

22. A nerve guide conduit comprising a poly(phosphoester) polymer in the shape of a tube having a diameter, a first end, a second end, and a wall having an outer surface and a luminal surface.

23. A nerve guide conduit comprising a polymer according to Claim 1.

24. The nerve guide conduit of Claim 22, wherein the polymer has an average molecular weight of between 10,000 and 25,000.

25. The nerve guide conduit of Claim 24, wherein the polymer has an average molecular weight of between 14,900 and 18,900.

26. The nerve guide conduit of Claim 25, wherein the polymer has an average molecular weight of between 15,000 and 17,000.

27. The nerve guide conduit of Claim 22, wherein the conduit has a surface porosity of between 2 and 58%.

28. The nerve guide conduit of Claim 27, wherein the conduit has a surface porosity of 35%.

29. The nerve guide conduit of Claim 27, wherein the conduit has a surface porosity of 8%.

30. The nerve guide conduit of Claim 22, wherein the tube has a diameter of between 1 and 2 mm.

31. The nerve guide conduit of Claim 30, wherein the diameter is 1.5 mm.

32. The nerve guide conduit of Claims 22, wherein the wall has a thickness of between 150 and 250mm.

33. The nerve guide conduit of Claim 32, wherein the thickness is between 170 and 240 mm.

34. The nerve guide conduit of Claim 22, wherein the wall comprises a plurality of layers.

35. The nerve guide conduit of Claim 34 comprising at least 3 layers.

36. The nerve guide conduit of Claim 34, wherein each layer is between 20 and 30 mm thick.

37. The nerve guide conduit of Claim 36, wherein each layer is 25 mm thick.

38. The nerve guide conduit of Claim 22, wherein the outer surface of the wall has greater microporosity than the luminal surface of the conduit.

39. The nerve guide conduit of Claim 22 further comprising a gene delivery system.

40. The nerve guide conduit of Claim 39, wherein the gene delivery system comprises a complex of DNA and a cationic polymer or lipid loaded into the conduit.

41. The nerve guide conduit of Claim 40, wherein the complex is particles of 20nm in diameter.

42. The nerve guide conduit of Claim 40, wherein the cationic polymer or lipid comprises polyethylenimine, poly-L-lysine, or chitosan.

43. The nerve guide conduit of Claim 40, wherein the cationic polymer or lipid comprises 1,2 - dioleoyl phosphatidylethanolamine.

44. The nerve guide conduit of Claim 43, wherein the cationic polymer or lipid comprises Transfast or GenePORTER.

45. The nerve guide conduit of any one of Claims 39 to 44, wherein the gene encodes a neurotrophic protein or a neuro-active neural fibre growth eliciting molecule.

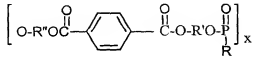
46. The nerve guide conduit of Claim 45, wherein the gene comprises NGF, BDNF or Bcl-2.

47. The nerve guide conduit of Claim 22, further comprising a sustained protein delivery system.

48. The nerve guide conduit of Claim 47, wherein the sustained protein delivery system comprises one or more microspheres loaded into the conduit, wherein the microspheres contain a protein that is released from the microspheres progressively.

49. The nerve guide conduit of Claim 48, wherein the microspheres are made from a poly(phosphoester) polymer.

50. The nerve guide conduit of Claim 49, wherein the microspheres are made from a polymer comprising the subunit



wherein R' is ethyl or butyl and R and R" are each a suitable side chain or a cross linking agent.

51. The nerve guide conduit of Claim 48, wherein the microspheres are made from poly(lactic-co-glycolic acid) or poly(lactide-co-glycolide).

52. The nerve guide conduit of any one of Claims 48 to 50, wherein the average diameter of the microspheres is between 5 and 20 mm.

53. The nerve guide conduit of Claim 52, wherein the average diameter of the microspheres is 10 mm.

54. The nerve guide conduit of Claim 48, wherein the microspheres release the protein over a period of at least three months.

55. The nerve guide conduit of Claim 48, wherein at least 100mm of protein is loaded per 10mm of conduit.

56. The nerve guide conduit of Claim 47, wherein the sustained protein delivery system comprises NGF, BDNF, CNTF, epidermal growth factor or fibroblast growth factor.

57. The nerve guide conduit of Claim 22, wherein the conduit is loaded with a bioartificial nerve graft comprising Schwann cells.

58. A method of regenerating a severed nerve having first and second nerve stumps comprising the steps of:

providing a nerve guide conduit according to Claim 22;

inserting the first nerve stump into the first end of the nerve conduit; and

inserting the second nerve stump into the second end of the nerve conduit.

59. The method of Claim 58, wherein the nerve is in the hand and the conduit is provided adjacent the tendons of the hand.

60. A method of fabricating a polymer comprising the steps of:

providing a solution of the polymer and a solvent; and

adding a first non-solvent at a first concentration and second non-solvent at a second concentration to the solution to provide a mixture.

61. The method of Claim 60, wherein the solubility of the polymer in the solvent is greater than 10 mg/ml.

62. The method of Claim 61, wherein the solubility of the polymer in the solvent is greater than 100 mg/ml.

63. The method of any one of Claims 60 to 62, wherein the solubility of the polymer in either or both of the non-solvents is less than 10 mg/ml.

64. The method of Claim 63, wherein the solubility of the polymer in either or both of the non-solvents is less than 0.1 mg/ml.

65. The method of Claim 60, wherein the solubility of the solvent in at least one of the first or second non-solvents or the solubility of at least one of the first or second non-solvents in the solvent is at least 0.5% w/w.

66. The method of Claim 60 further comprising the step of increasing the concentration of the second non-solvent in the mixture.

67. The method of Claim 66, wherein the concentration of the second non-solvent in the mixture is between 0 and 60%(v/v) and is increased to a concentration of between 65 and 75 % (v/v).

68. The method of Claim 67, wherein the concentration of the second non-solvent is increased to 70% (v/v).

69. The method according to Claim 60, wherein the fabricated polymer has a predetermined porosity and further comprising the steps of, before adding the first and second solvents, determining the ratio of the first concentration to the second concentration required to achieve the predetermined porosity and then adding the first and second solvents in the required ratio.

70. The method of Claim 69, wherein the step of determining the ratio of the first concentration to the second concentration comprises determining the demixing boundary and gelation point of the mixture.

71. The method of Claim 70, wherein the step of determining the demixing boundary comprises titrating a pure non-solvent into the solution and detecting the concentration of non-solvent required to produce a permanent turbidity in the mixture.

72. The method of Claim 70, wherein the step of determining the gelation point comprises evaporating the solvent from the solution, measuring the weight of the solution as a function of time to determine the rate of evaporation of the solvent, and detecting when the rate of evaporation shows a sharp decrease.

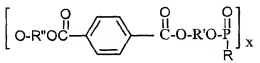
73. The method according of Claim 60, wherein the solvent comprises chloroform.

74. The method of Claims 60, wherein the first non-solvent comprises water.

75. The method of Claims 60, wherein the second non-solvent comprises methanol.

76. The method of Claim 60, wherein the polymer is a poly(phosphoester).

77. The method of Claim 76, wherein the polymer is a poly(phosphoester) comprising the subunit



wherein R' is ethyl or butyl and R and R" are each a suitable side chain or a cross linking agent.

78. The method of Claim 60 further comprising the steps of:
dipping a mandrel having a horizontal axis into the solution;
removing the mandrel from the solution to provide a coated mandrel; and
drying the solution on the coated mandrel.

79. A method of fabricating the nerve guide conduit of Claim 22 comprising the steps of:

providing a solution comprising a polymer and a solvent;
dipping a mandrel having a horizontal axis into the solution;
removing the mandrel from the solution to provide a coated mandrel;

drying the solution on the coated mandrel to provide a polymer coated mandrel; and

removing the polymer from the polymer coated mandrel.

80. The method of any one of Claims 78 or 79 further comprising the step of immersing the coated mandrel in a mixture comprising one or more non-solvents to provide a coated mandrel exposed to a non-solvent; and removing the one or more non-solvents from the coated mandrel exposed to a non-solvent.

81. The method of Claim 80, wherein the steps of dipping the mandrel into the solution; removing the mandrel from the solution to provide the coated mandrel, and immersing the coated mandrel in the non-solvent are repeated one or more times to produce a mandrel with multiple polymer coatings.

82. The method according to Claim 81, wherein the steps of dipping the mandrel into the solution, removing the mandrel from the solution to provide the coated mandrel, and immersing the coated mandrel in the non-solvent are repeated at least three times.

83. A method of Claims 80, further comprising dipping the coated mandrel exposed to the non-solvent into the solution before the mixture of one or more non-solvents is completely removed from the coated mandrel exposed to a non-solvent.

84. The method according to any one of Claims 78 or 79, wherein the drying is performed by freeze drying.

85. The method according to any one of Claims 78 or 79, wherein the drying is performed by vacuum drying.

86. The method according to any one of Claims 78 or 79 further comprising the step of rotating the coated mandrel along the horizontal axis to reduce variations in the thickness of the polymer on the polymer coated mandrel.

87. A method of fabricating a polymer comprising the steps of:
providing a solution comprising a polymer and a solvent;
casting the solution in a mold;

evaporating the solvent to provide a mold coated with the polymer; and

removing the polymer from the mold to provide the polymer as a sheet having first and second opposing edges.

88. A method of fabricating a nerve guide conduit according to Claim 22 comprising the steps of:

providing a solution comprising a polymer and a solvent;

casting the solution in a mold;

evaporating the solvent to provide a mold coated with the polymer; and

removing the polymer from the mold to provide the polymer as a sheet having first and second opposing edges.

89. The method according to Claim 87 or 88 further comprising the steps of rolling the polymer sheet around a mandrel so that the first and second opposing edges contact each other and sealing the first and second opposing edges together to form a tube.

90. The method according to Claim 89, wherein the sealing is accomplished by exposing the contacted first and second opposing edges to a solvent.

91. The method according to claim 90, wherein the solvent is chloroform or dimethyl formamide.

92. The method of fabricating a nerve guide conduit according to Claim 47 or 56 comprising the steps of:

mixing the protein delivery system with a solution or slurry of the poly(phosphoester) to provide a mixture; and

forming the mixture into the nerve guide conduit.

93. The method according to Claim 92, wherein the solution or slurry is an aqueous solution or slurry.

94. The method of claim 79, wherein the solubility of the polymer in the solvent is greater than 10mg/ml.

95. The method of claim 79, wherein the solubility of the polymer in the solvent is greater than 100mg/ml.

96. The method of claim 80, wherein the solubility of the polymer in the one or more non-solvents is less than 10mg/ml.

97. The method of claim 80, wherein the solubility of the polymer in the one or more non-solvents is less than 0.1mg/ml.